DESCRIPTION OF GOODS
AST PHOENIX SERIES PIPER SEMINOLE
TWIN ENGINE, WIDE COCKPIT, FLIGHT SIMULATOR
(WILL MEET FAA LEVEL 1 THROUGH 5 FTD REQUIRMENTS)

In this proposal Aviation Simulation Technology, Inc. meets or exceeds all requirements for all levels of Flight Training Devices (FTD's) through Level 5. At the time that a Level 1 through 5 flight training device is finished and approved by the FAA for training, a set of data is generated for the purpose of documenting the training device's base line performance.

The new AST **Phoenix Series FTD** is scheduled for announcement and introduction at the NBAA Convention at Orlando, FL in November, 1996. The publication of brochures and related printed items has not been completed at this time.

Aviation Simulation Technology, Inc. (AST) is submitting a new, **Phoenix Series FTD**, the latest innovation in fully digital, software driven FTD's utilizing both "flight test validated" and "predicted data", supplied by **Kohlman Systems Research (KSR)**, the nation's leader in flight test data acquisition, as it's entry to your Flight Simulator. The **Phoenix Series FTD** in this proposal is representative of the **PIPER SEMINOLE.**

SYSTEMS WILL INCLUDE:

Anti - Ice and De - Ice (Optional)
Auto Pilot (Optional)
Battery
Circuit Breakers
Control Loading
Engines
Electrical
Flight Controls "Dual"
Flight Director (Optional)
Flight Instruments
GPS "Trimble 2,000" (Optional)
Graphic Interface Instructor Station
Landing Gear and Warning
Navigational
Oxygen (Optional)
Pressurization (Optional)
Propellers
Radio Package "King Silver Crown"
HSI (Optional)
RMI (Optional)
Sound
Warning System
Trim, Electrical and Manual
Visual System and Data Base
Wing Flaps

AERODYNAMICS COEFFICIENTS AND DERIVATIVES TO INCLUDE:

Basic Aerodynamic Model, includes all stability, control, lift and drag coefficients through the aircraft flight envelope with all the pilot Operating Handbook specified geometry variation. Includes the effects for ground proximity on the aerodynamic design coefficients and take off landing performances.

Lift, drag, side force, pitching moment, rolling moment, yawing moment, CG and moments of inertia, basic lift coefficient, ground effect on lift, basic drag coefficient, ground effect on drag, basic pitching moment and downwash increment due to flap deflection are provided on the **AST Phoenix Series FTD.**

SYSTEMS DESCRIPTION

CIRCUIT BREAKERS:

All circuit breakers will be placed as in the Piper Seminole aircraft. Systems governed by circuit breakers will not function when the appropriate breakers are pulled by the pilot or popped by the instructor.

CONTROLS:

The **AST-Phoenix Series Piper Seminole FTD** will have dual flight controls and Control Loading that will provide a accurate dynamic electromechanical digital control loading system. A primary flight control model contains the static and dynamic characteristics gearing rations, friction, cable stretch and inertia. Includes aerodynamic hinge moments of all three axis control system, elevator, rudder and ailerons and secondary flight controls model including wing flap, trim system and rudder. In addition, flight control surface failures can be simulated to include "frozen" and "floating" conditions.

ELECTRICAL:

The Electrical system will replicate that of the Piper Seminole.
> **Failures:** to include single or dual Alternator, Battery, Bus, Magnetos (failed or hot) and Starter failure.

ENCLOSURE:

A fully enclosed (King Air) aircraft style structure, with a locking door - all computer components are enclosed with no outside external accessories - that includes the instructor position with a Graphic User Interface Station.

PROPULSION MODEL:

The proposal will include propulsion model of the Lycoming 180 horse power. All appropriate engine instrument markings, and indications will be correct.

The engines will include all normal operations with extra failure capabilities including fuel pump, oil systems, partial and total engine malfunction.

ENGINE CONTROLS:

The control levers are grouped along the upper portion of the pedestal. Pushing forward on a control lever increases its appropriate function, pulling back decreases it. The knobs on the levers are shaped to standard government configuration so they can be identified by touch. The controls are centrally located for ease of operation from either the pilot or the copilot seat.

ENGINE ICE PROTECTION:

COWL FLAPS:

The cowl flap for each engine is controlled by a manual control lever located as in the Piper Seminole. "systems and flight conditions affected by cowl flaps are correct".

FLIGHT CONTROLS:

This FTD is equipped with dual control columns for the pilot and copilot. The control wheels are interconnected and provide aileron and elevator control. Control loading is included that provides accurate dynamic electromechanical digital control loading system.

      Failures; flight control surface failures can be simulated to include "frozen " and "floating" conditions.

This FTD is equipped with dual rudder pedals with functional toe brakes, one set for the pilot and one set for the copilot-pilot.

GRAPHIC INTERFACE INSTRUCTOR STATION:

The instructor station is computer driven, CRT based, menu driven with sub menus to control all pertinent flight data and environmental condition to control the FTD. This station will be able to pre program failures.

TRIM CONTROLS AND SYSTEM:

Electric elevator trim switches are mounted on both the pilot and copilot-pilot wheel. Manual elevator, aileron, and rudder controls are mounted on the center console.

      Failures: trim failures include both "frozen" and "run away" trim conditions.

FLIGHT INSTRUMENTS:

The flight instruments are located on a panel directly in front of the pilot's seat. Standard flight instrumentation includes attitude and directional gyros, airspeed, altimeter, vertical speed, turn coordinator, and gyro pressure. A magnetic compass is mounted above the instrument panel and an outside air temperature indicator is located on the left side panel, or proper position of the aircraft quoted. A quartz digital readout clock is mounted in the correct location.

      Failures: Flight instruments will be fully functional with the capability of individual failure upon instructor request. The appropriate instruments will also fail with a instructor induced vacuum failure. Static system failure with correct systems can be induced from the instructor station, "such as pitot ice".

FUEL SYSTEM:

Normal fuel system operations.
>**Failures:** instructor induced failures to include asymmetric fuel load, fuel leak, and fuel capacity in tanks.

GROUND CONTROL:

Ground handling capabilities, spring constant, damping factor and braking forces.

LANDING GEAR:

The landing gear is controlled by a two-position switch, which must be pulled out of the safety detent before it can be moved to the opposite position. The landing gear position lights are located above the control switch. Three green lights, forming a triangle to represent the individual gears, are illuminated whenever the gears are down and locked. A red light, immediately to the right of the three green lights, illuminates anytime one or all of the landing gears are in transit or in any intermediate position. All of the lights are extinguished when the gears are up and locked. (The landing gear handle and gear lighting system will be as in the Piper Seminole and function correctly).
>**Failures:** instructor requested failures of Up, Down, and In Transition malfunctions.

NAVIGATION:

The **AST Phoenix Series FTD** utilizes the Jeppesen Navigational Data Base of the entire lower 48 states, with up-date capabilities.
>**Failures:** instructor may fail any navigation station in real time.

NETWORK CAPABILITIES:

The **AST Phoenix Series FTD** will be able to network together Simulator to Simulator and Simulator to Air Traffic Control Radar Simulator in real time. (Optional) (Embedded interactive networked communications and visual simulation).

RADIO PACKAGE: "AVIONICS"

The AST Phoenix Series FTD utilizes King Silver Crown Avionics package including the KNS-80 RNAV. This radio package, as in most of this offer, meets and exceeds all normal requirements. (Optional Equipment Could Include HSI, RMI, the King KFC-200 "type" Flight Director System, Trimble GPS 2000 and a fully coupled autopilot).

SOUND SYSTEM:

The **AST Phoenix Series FTD** sound system includes not only engine sounds, and touchdown "squeak", it also will include a minimum of gear up, gear down, wind, and flap operations, noise. A bad magneto sound is also available if inserted by the instructor.

VACUUM SYSTEM:
    Failures: to include one or both vacuum systems.

VISUAL SYSTEM:

The **AST Phoenix Series FTD** includes the latest state of the art all digital color visual system, for the pilot and copilot position. This visual system will include (Day, Dusk, Night and control of weather environment and visibility and a 35 inch monitor). The visual data base includes approximately thirty (30) airports with one (1) airport, with specific/realistic details. All airports will have the correct field elevation, runway lengths, and runway heading. All runway and approach light configurations will be as published on the Jeppesen Airport and Approach Charts. The visual system has the capability to navigate to all airports and land on any runway, in the visual data base without instructor assistance. Other aircraft and ground vehicles are included. (A new optional 180 degree digital color visual system is available with monitors or projectors and screens for an additional cost). FTD Level 3 Visual Certification is not available at this time with current pricing.

WARNING SYSTEM:

The AST Phoenix Series FTD includes both a Landing Gear and Stall Warning System.

The new AST Phoenix Series FTD allows AST to supply a new level of simulation to the flight training market. AST is striving to a new fidelity in simulation in our new, fully digital, software driven AST Phoenix Series FTD. A one year warranty is included.

Aviation Simulation Technology, Inc. has picked the NBAA convention to unveil our new Phoenix Digital Series FTD Simulators. AST has teamed with Kohlman Systems Research (the leader in flight test acquisitions) to supply AST with flight test validated and predictive data to program our new software driven FTD Simulator.

On display will be either our new Piper Seminole or our Beechcraft King Air 1900C Turboprop Phoenix Series FTD and if we are able to show both simulators they will computer networked together Simulator to Simulator and Simulator to Air Traffic Control Radar Simulator.

Special pricing will be available for orders taken before December 1, 1996. Attractive trade in allowances on AST 300 Simulators.